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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/776,472

02/11/2004

Daniel James Branagan

NANO004U

4067

32047

7590

03/25/2008

GROSSMAN, TUCKER, PERREAULT & PFLEGER, PLLC  
55 SOUTH COMMERCIAL STREET  
MANCHESTER, NH 03101

EXAMINER

ZHENG, LOIS L

ART UNIT

PAPER NUMBER

1793

MAIL DATE

DELIVERY MODE

03/25/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/776,472	<b>Applicant(s)</b> BRANAGAN, DANIEL JAMES	
	<b>Examiner</b> LOIS ZHENG	<b>Art Unit</b> 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 14 January 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 6,7 and 11-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 6,7 and 11-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Status of Claims***

1. Claims 6-7 and 11 are amended in view of applicant's amendments filed 14 January 2008. Claims 8-10 are canceled. Claims 1-5 remain withdrawn from consideration. Therefore, claims 1-7 and 11-16 are currently under examination.

### ***Status of Previous Rejections***

2. The rejections of claims 6-7 and 9-16 under 35 U.S.C. 103(a) as obvious over Dardi et al. US 4,615,864 (Dardi) in view of Dickson et al. US 4,381,943(Dickson) are withdrawn in view of applicant's claim amendments filed 14 January 2008.

### ***Claim Interpretation***

3. Regarding claims 6 and 11, since no specific order is required for executing processing steps, the examiner is interpreting that the sequence of the claimed processing steps can take place in any order. In addition, since processing steps recite the same iron based metallic coating alloy and the metal surface is relatively clean(i.e. the cleaned surface may still contain oxides) with the application of the iron based metallic coating alloy, the examiner is interpreting that the claimed processing step of applying the liquid metal of the iron based alloy to an oxidized metal surface to provide a clean metal surface and the claimed processing step of applying an iron based metallic coating alloy to the clean metal surface may take place simultaneously(i.e. these two processing steps are the same coating application step) based on the broadest reasonable interpretation.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 6-7 and 11-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dorfman US 4,822,415(Dorfman), and further in view of Branagan et al. US 6,125,912 (Branagan).

Dorfman teaches thermal spraying processing using an iron based alloy powder to produce a protective coating(abstract, col. 1 lines 6-9). Dorfman's iron based alloy composition comprising Cr, B and C(abstract, col. 2 line 66 – col. 3 line 65). Dorfman further teaches that preferably, less than 15% manganese can be included in the iron based alloy to improve corrosion resistance and ductility, preferably Zr, Nb, Ti, Va, Hf in a total amount of less than 10% can be added to further improve wear and corrosion resistance, and preferably phosphorous in an amount of less than 1% can be added to reducing melting point(col. 4 lines 6-18). The iron based alloy powder as taught by Dorfman can be produced by standard method such as atomization and the thermal spray process using the iron based alloy powder produces a coating that is entirely amorphous(col. 4 lines 53-63). Dorfman further teaches that the thermal spraying process is a plasma spraying process(col. 1 lines 24-39).

Regarding claim 6 and 11, the thermal spraying process as taught by Dorfman reads includes the claimed step of providing an atomized iron based metallic coating

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alloy comprising the claimed deoxidizing elements including manganese, a metal selected from Cr, Va, Ti, Zr, Hf, Nb and combination thereof and an oxygen seeking nonmetal/metalloid including boron. The thermal spraying process as taught by Dorfman also inherently teaches the claimed melting step, the claimed step of application of iron based metal alloy to a metal surface to provide a coating layer. The claimed removing of oxidized metal surface layer, which reads on a metal surface with a native oxide layer, to provide a relatively clean metal surface is inherently taking place in the coating application process of Dorfman.

However, Dorfman does not teach that the thermal spraying process is a process of metallic coating by claimed high velocity oxy-fuel spraying technique.

Branagan teaches that iron based alloys are especially useful for spray coating processes such as high-energy plasma, low pressure plasma spraying, high velocity oxy-fuel and other spray forming processes(col. 3 lines 1-10).

Therefore, one of ordinary skill in the art would have found it obvious to have substituted the plasma thermal spraying technique in the process of Dorfman with high velocity oxy-fuel spraying technique with expected success since Branagan teaches that plasma spraying and high velocity oxy-fuel functional equivalent thermal spraying process suitable for producing a iron based metallic coating.

In addition, the total amount of deoxidizing elements in the iron based metal alloy as taught by Dorfman in view of Branagan overlaps the claimed deoxidizing element amount of 5-70%. Therefore, a prima facie case of obviousness exists. See MPEP 2144.05. The selection of claimed deoxidizing element amount range from the

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disclosed range of Dorfman in view of Branagan would have been obvious to one skilled in the art since Dorfman in view of Branagan teach the same utilities in the disclosed deoxidizing element amount range.

Furthermore, the examiner takes a position that the claimed ASTM C633 bond strength is an inherent property of the metallic coating layer. Since Dorfman in view of Branagan teach a coating process that is substantially the same as the claimed coating process using an iron based alloy that is substantially the same as the claimed iron based coating alloy, the coating layer formed by the process of Dorfman in view of Branagan would also have an ASTM C633 bond strength that is substantially the same as the claimed at least about 12,000psi. In other words, one of ordinary skill in the art would have found the claimed ASTM C633 bond strength of at least 12,000psi obvious in the metallic coating formed by the coating process of Dorfman in view of Branagan uses the substantially the same metallic coating as claimed in a substantially the same coating process as claimed.

Regarding claim 7, Dorfman further teaches that iron based alloys with lower boron content exists in amorphous form if produced by quenching(col. 4 lines 26-30). Therefore, the examiner concludes that the process of Dorfman in view of Branagan does not produce precipitate when the iron based alloy is melted.

Regarding claim 12, Dorfman further teaches the claimed oxygen seeking non-metal/metalloid such as carbon and phosphorous.

Regarding claims 13-16, the less than 15% of Mn as taught by Dorfman in view of Branagan encompasses the claimed about 2.3% and the claimed about 0.8% Mn.

Therefore, a prima facie case of obviousness exists. See MPEP 2144.05. The selection of claimed Mn amount range from the disclosed range of Dorfman in view of Branagan would have been obvious to one skilled in the art since Dorfman in view of Branagan teach the same utilities in the disclosed Mn amount range.

### ***Response to Arguments***

6. Applicant's arguments filed 14 January 2008 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LOIS ZHENG whose telephone number is (571)272-1248. The examiner can normally be reached on 8:30am - 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Roy King/  
Supervisory Patent Examiner, Art  
Unit 1793

LLZ